Space Weather Forecast

Issued on Friday, 15 July 2022 at 13:02 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: R1-R2 radio blackouts due to moderate-class X-ray flares likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been moderate in the past 24 hours, with a peak low-end moderate class X-ray flare observed from a sunspot region in the northeast at 14/2148UTC. This sunspot was one of up to six on the current Sun, with all bar a new region in the far east showing as large and complex magnetically bipolar groups.

Three of these large regions showed decreases in area in the period, with all exhibiting decaying in their trailing groups especially (trends that point to reducing flare risk). By contrast, two showed proliferation and areal growth - the former in its trailers and the latter in its leaders. The new region in the far east currently presents as a magnetically unipolar group, however this may yet reveal further detail as the viewing angle improves.

Figure 1: Locations of X-ray flares in the past 24 hours (left, courtesy of SIDC ROB); as well as latest available visible and magnetic imagery. Flare activity can be seen to be roughly correspond to growth trends rather than overall sunspot complexity, with the exception of the upper rightmost spot, which is flaring but also visually shrinking.

There are currently numerous large 'filaments' (arcs of plasma) on the Sun in the solar 'tropics', some with spans in excess of 20 degrees, and all of which are being monitored. These may present a risk of Coronal Mass Ejections (CMEs) should they lift off with sufficient impetus.

Current satellite imagery shows non-Earth-directed CMEs heading southeast from a 14/1500UTC 'prominence eruption' (plasma leaving the sun's edge); also eastwards from the aforementioned moderate-class X-ray flare. Both of these events have been modelled and are not expected to affect Earth.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.

A more central possible 'disappearing filament' was observed from the northwest around 14/2300UTC, with a concurrent central southern hemisphere event. Finally an eastern hemisphere event from near the moderate-class flare producing sunspot occurred around 15/0730UTC. These later events have yet to show on imagery, should any interplanetary CME have resulted. At the time of writing therefore, no CMEs with Earth-bound components were in evidence.

Solar Wind / Geomagnetic Activity: The solar wind has been elevated over the past 24 hours, likely the result of connection to the fast wind of a coronal hole.

The solar wind speed was elevated throughout with a roughly level trend after an initial slight increase. The number of particles comprising the solar wind was slightly elevated over the same period, on a flat trend. Meanwhile the magnetic field associated with these particles showed a slight decline from an early high. The north-south component of the field was mainly anti-aligned with Earth's field, especially between 14/1400UTC and 15/0400UTC.

Despite the elevated speed and period of anti-alignment, the net result of the above solar wind measures was nevertheless provisionally mostly quiet, and well below Minor Storm G1.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be moderate, with a daily slight chance of strong-class flares. One of the current large sunspots should leave the Earth-facing side of the sun into the new UTC working week, resulting in a slight dip in flare risk on day four, Monday 18 July. Arriving bright flux over the eastern solar horizon may compensate for any loss, however.

Solar Wind / Geomagnetic Activity: No CMEs feature in the current forecast.

The only fast wind expected in the period is that from the current 'coronal hole', with this due to wane in earnest over the coming UTC weekend to leave a slow regime by the new week. Reliably quiet conditions ought to have been restored by the new week.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, however there is a daily slight chance of S1 or greater given the weight of numbers of large regions transiting westward across the facing side of the Sun at present.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	75	75	75	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.